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HEALTH DEPARTMENT BACTERIOLOGICAL LABORATORY.

Dr. Hibbert Winslow Hill, Director of the Bacteriological Laboratory of the Health Department, makes the following report on the work under his supervision:

The value of the bacteriological diagnosis of disease is now very clearly established, not only as it aids the physician in his everyday work but also in the wider field of preventive medicine. The early recognition of the development of an infectious disease permits the carrying out of isolation and other sanitary precautions before the infection has an opportunity to become widely spread. Moreover, many such cases, after apparent full recovery, still retain the infectious material in a form capable of transmitting the disease. Under regulations requiring the isolation of such cases of apparent recovery until bacteriological examination shows that the infectious material has completely disappeared, the prevalence of those infectious diseases which can be so examined is reduced to a remarkable extent.

On the other hand, it sometimes happens that non-infectious cases yield symptoms resembling an infectious disease so closely that a long and tedious isolation would be deemed necessary, but that the bacteriological examination reveals the true nature of the attack, and the patient is saved from wearisome precautions, not really essential.

For these reasons, all of the chief cities and many of the larger towns of the United States have established laboratories where the bacteriological diagnosis and bacteriological supervision of infectious diseases can be carried on. Such laboratories are usually connected with the Health Departments of the various municipalities.

In Boston, the value of this work was recognized by the Board of Health many years ago, at a time when the more general recognition, since accorded, had not yet developed. Three years ago, arrangements were made whereby the Diphtheria Diagnosis was carried on for the Health Department under Professor Ernst at the laboratory of Harvard Medical School, pending the formation of a laboratory devoted exclusively to bacteriological work, under the control of the Health Department. The necessary preliminaries having been at last successfully completed, the Health Department Laboratory was opened on May 10, 1898, at which time the Diphtheria Diagnosis was transferred to it from the Harvard Laboratory. The essentials of central locality, sufficient floor-space, good light, gas, water, steam and electricity, which go to form the ground-work of a thoroughly efficient laboratory, were secured. The necessary fitting was pushed through as fast as might be, compatible with good work. Apparatus, necessarily of the first quality, and sufficient in amount for the work in hand, was secured. Provision was made for the expected development of the science as well as for the natural growth of the needs of the city in the future, while simplicity and absence of all non-essentials was made the ruling principle of the design.

The present article is intended to describe the methods of the Diphtheria Diagnosis only. In a subsequent article, the Typhoid Diagnosis will be treated in a similar manner.

For the prompt and efficient service of the Diphtheria Diagnosis, culture-stations have been established throughout the city. These stations are simply depots, generally in drug-stores, where the physician may obtain the culture-outfits, supplied to the stations from the laboratory, free of charge. After the physician has used the outfit, as described below, it is returned to the culture-station, from which it is promptly forwarded to the laboratory, where the examination is made and the result reported direct to the physician and to the Board of Health.

It will be seen that on the care and promptness of the druggists in charge of these stations, quick response from the laboratory is largely dependent.

The outfits consist of a small copper box containing two test tubes of thick glass, secured in place by springs. This latter design is now being used for, it is believed, the first time in this country, and has so far proved very satisfactory. A circular of directions, a circular defining the relation of the Board of Health to the laboratory results, and a card, having appropriate blanks for the date, patient's name and address, physician's name and address, and other necessary information, are enclosed with the tubes. One of the tubes contains sterilized blood-serum. The other contains a brass rod, on the end of which a small pellet of cotton, called a swab, is securely fastened. Box, tubes and swab are all sterilized each time before leaving the laboratory. The card and circulars are never used more than once. By these rules the possibility of transferring diphtheria from one case to another through the medium of the outfit itself, small as it would be even without such precautions, is obviated entirely.

In using the outfit, the physician simply obtains, on the swab, from the suspected throat a small quantity of the infectious material and transfers it to the surface of the serum. The card is then filled out, and the subsequent work devolves on the laboratory. There the tubes thus infected are "incubated," i. e., kept in a special receptacle, at the temperature of the human body, for about fourteen hours. The tubes are then examined. In most cases, a considerable growth of different kinds of bacteria is found, including some of those occurring in healthy throats, as well as those responsible for the various kinds of "sore throat" which are not diphtheria. If the patient from whom the culture comes has true diphtheria, there will be found also the special bacillus of diphtheria."

In order to distinguish these numerous different forms from each other, the microscope is an essential. The growth in the tubes, therefore, is transferred to a glass slide, stained with a special preparation

which makes the bacteria more easily seen and recognized, and examined under a magnification of about one thousand diameters, which causes the bacteria to appear one million times larger than they are in reality. The bacilli of diphtheria then seem to be about as large as one of the pieces of an ordinary match which has been cut into sixths or eighths. Fortunately these bacilli have certain peculiarities which make their recognition quite possible, after some practice and experience, in spite of their extreme minuteness.

After the tubes are examined, all the results obtained are reported to the Board of Health, and each physician is notified of the finding in his own case.

If the bacilli of diphtheria are found, the patient from whom they came is thereby shown to be a source of danger to the public and rigid isolation is enforced until subsequent examination shows that the bacilli have disappeared. In many cases of convalescence from diphtheria, the patient may be apparently or really quite recovered himself, and yet the bacilli remain. It is evident that for the protection of the public, the Board of Health must continue to insist on isolation until the patient is no longer capable of infecting others. Moreover, it has been found that in such cases, single cultures may be taken sometimes which fail to show the presence of the bacilli although they are present, perhaps because they are few in number or at the time are lodged in the recesses of the throat where they cannot be reached. It has been found necessary, therefore, to insist that two consecutive cultures taken at different times should both fail to show the bacilli, before the patient is pronounced "safe" to go at large again.

Every week a summary of the cultures examined for that week is forwarded to the Health Department for publication in THE CITY RECORD. The cultures are classified as Primary, when they are from cases not examined before; Secondary, when from cases already examined one or more times. The results are classified as Positive, when the bacilli of diphtheria are found; Negative, when the bacilli are not found; "No growth," when, as occasionally happens, nothing can be found on the serum after incubation. This latter results either from the serum having been kept too long at the culture-station and having therefore become dry, or from some accident having allowed the admission of bacteria or moulds from the air to the serum. Occasionally, certain germs, transferred from the throat itself spoil the serum; sometimes, perhaps, an antiseptic has been used in washing out the throat just before the culture was taken. Of course, it must be added that very occasionally no growth occurs, because the physician does not follow the directions as closely as he should, but the "diphtheria diagnosis" is now so generally used that this source of trouble must be very small. The percentage of such "no growths" from all causes is, after all, insignificant, and does not interfere to an appreciable extent with the practical utility of the method.

Dear Dr Green

I am rather ashamed of the form in which these "reprints" have been furnished me. The official "City Record", however, does not furnish reprints in the ordinary sense. You will see that these are nothing but galley proofs, apparently.

Very respectfully yours

Hilbert Winslow Hill

